

## 產品特點

- 低介電常數
- 高 Tg 值 195°C (DSC)
- 優良耐熱性, 適用於 Lead Free Process
- 優良的尺寸安定性及通孔可靠性
- 應用於高多層板高密度 PCB, 高頻通訊設備

## Features

- Low Dk material
- High Tg 195°C (DSC)
- Outstanding thermal resistance and suitable for Lead Free process
- Excellent dimensional stability, through-hole reliability
- Designed for application of high-layers, high density PCB, high frequency telecommunications

## 名稱說明 Designation Introduction

GA-LDTL	單雙面板及多層線路板用芯板 Single or double side PCB and thin core for multi-layer PCB	ANSI 等級: FR-4 ANSI grade: FR-4
GA-LDB	多層線路板用半固化片 Prepreg for multi-layer PCB	

## UL 認證 Certification UL (File No: E186152)

Model	Min. Thickness (Inch)	Clad cond. Thickness		Max. Area Diameter (mm)	Solder Lts.		UL 94 Flame Class	MOT (°C)
		Min. (µm)	Max. (µm)		Temp. (°C)	Time (sec)		
GA-LDTL/ GA-LDB	0.002	17	140	50.8	300	30	94V-0	130
	0.015	17	140	50.8	300	30	94V-0	130

## Performance List for Laminate (Specification sheet IPC-4101/24/121)

Characteristic		Unit	Condition	Typical Values	SPEC.
Volume Resistivity		MΩ-cm	C-96/35/90	$7.5 \times 10^8$	$\geq 10^6$
Surface Resistivity		MΩ	C-96/35/90	$2.0 \times 10^8$	$\geq 10^4$
Permittivity (RC50%)	At 1MHz	-	C-24/23/50	3.82	$\leq 5.4$
	At 1GHz		C-24/23/50	3.75	
Loss Tangent (RC50%)	At 1MHz	-	C-24/23/50	0.0085	$\leq 0.035$
	At 1GHz		C-24/23/50	0.0108	
Arc Resistance		Sec	D-48/50+D-0.5/23	120	$\geq 60$
Dielectric Breakdown		KV	D-48/50	40	$\geq 40$
Moisture Absorption		%	D-24/23	0.100	$\leq 0.5$
Flammability		-	C-24/23/50+E-24/125	94 V-0	94 V-0
Peel Strength (HTE 1OZ)		Lb/in(N/mm)	After thermal stress 288°C × 10Sec solder floating	8(1.40)	$\geq 6(1.05)$
Thermal Stress Test		-	288°C × 10Sec × 6cycle floating	Pass	Pass
Flexural Strength	LW	N/mm <sup>2</sup>	A	576	$\geq 415$
	CW	N/mm <sup>2</sup>	A	452	$\geq 345$
CTE-X		PPM/°C	TMA	15	-
CTE-Y		PPM/°C		17	-
Z-Axis CTE	Alpha 1	PPM/°C	TMA	56	$\leq 60$
	Alpha 2	PPM/°C		283	$\leq 300$
Z-Axis CTE (50~260°C)		%		2.8	$\leq 4.0$
Time to Delaminate (Copper removed)	T260	Min	TMA	$\geq 30$	$\geq 30$
	T288	Min	TMA	5	$\geq 5$
Td (5% Weight loss)		°C	TGA	320	$\geq 310$
Glass Transition Temperature		°C	DSC	195	$\geq 195$

注:測試樣品規格為 62mil 1/1(無特殊說明情況下).

Note: Test sample is 62mil 1/1(without special remark).

Thickness Inch (mm)	Copper Cladding OZ (µm)		Size		Thickness Tolerance
			Inch	mm	
0.002 (0.051)	1/3(12)	0.5(17)	49×36.8	1244×0935	IPC-4101 Class C/M
To	1.0(35)	2.0(70)	49×40.7	1244×1035	
0.125 (3.2)	3.0(105)	4.0(140)	49×42.7	1244×1085	

注:

- 1.層壓板有效面積為 36”(經)×48”, 40”(經)×48”, 42”(經)×48”.
- 2.可根据客戶的不同需要選用高溫伸長率銅箔, 超高溫伸長率銅箔, 雙面處理銅箔, 反轉銅箔,VLP 銅箔及超薄銅箔等多种不同類型的覆銅箔.
- 3.保持芯板与基材經緯方向的一致,對保證多層板的平整度非常重要,其經緯方向標識可參考品質保證書.

Note:

1. The effective area of laminate is 36” (Grain) ×48”, 40” (Grain) ×48”, 42” (Grain) ×48”.
2. Copper cladding type can be selected from HTE, super HTE, double treated, reversed, very low profile or ultra thin copper foil, depended on customer needs.
3. Keeping the core and prepreg in the same grain direction is critical to ensure flatness of the multilayer boards. Grain direction is shown on the “Certificate of Conformance”.

## 結構 Construction

Thickness		Normal Construction		Thickness		Normal Construction	
mm	mil			mm	mil		
1.00	39	7628	5 ply	0.35	14	2116	3 ply
0.90	36	7628	5 ply	0.30	12	1506	2 ply
0.74	29	7628	4 ply	0.20	8	7628	1 ply
0.53	21	7628	3 ply	0.13	5	2116	1 ply
0.50	20	7628	3 ply	0.10	4	2116	1 ply
0.40	16	7628	2 ply	0.08	3	1080	1 ply
0.38	15	7628	2 ply	0.05	2	106	1 ply

注:1.00, 0.90, 0.74mm 厚度包含銅厚,其它規格不包含銅厚,針對特殊要求規格疊構,我司可滿足并生產.

Note: 1.00, 0.90, 0.74 mm thickness include cladding, all others exclude cladding. Other thickness and constructions are available to special order.

## 半固化片儲存要求 Prepreg Storage Requirement

IPC-4101 3.17

儲存條件 1: 從生產日期起在低於 5°C 環境中保存 6 個月

Condition 1: Six months when stored at <5°C

儲存條件 2 : <23°C, <50%RH 3 個月

Condition 2: Three months when stored at <23°C and <50 % RH

注:

1. PP 必須避免儲存在接觸 UV 光和有輻射的外部環境
2. PP 超過儲存期，當使用時必須重新測試各項物性，確認合格方可使用。

Note:

1. Prepreg should be stored in the absence of a catalytic environment such as UV light or excessive radiation.
2. Prepreg exceeding the shelf life requirements prior to shipment to the user must be retested and recertified to agree upon specifications.

## 建議壓合參數 Recommended Press Parameter

1. 材料實際溫度為 90~130°C 升溫速率建議:  
低升溫速率:1.2~2.5°C/min,高壓壓力:350~400psi  
高升溫速率:3.2~5.5°C/min,高壓壓力:250~300psi
  2. 材料實際溫度升至 195°C 后,需保持 60 分鐘以上使環氧樹脂固化完全
  3. 冷卻過程中材料溫度高于 180°C 時,降溫速率建議控制在 1.5°C/min 以下以避免引起板翹
- 注:以上設定僅供參考,具體程式須依熱壓機及排版狀況作相應調整.

1. Heating rate suggestions when material temperature range is 90~130°C  
Heating rate: 1.2~2.5°C/min for 350~400psi pressure  
Heating rate: 3.2~5.5°C/min for 250~300psi pressure
2. Temperature of material reach 195°C must is held for at least 60min to allow epoxy resin to cure fully.
3. In order to avoid warpage and twist issue, cooling rate of material suggest to be kept under 1.5°C/min, when the temperature of material is still above 180°C

Note: All values mentioned above are just for reference, clients can modify relative parameters according to the machines and designs.